REMARKS

This response is a full and complete response to the Office Action mailed March 30, 2005. In the present Office Action, the Examiner has noted that claims 1-23 are pending, that claims 1-23 stand rejected under the statutory provisions of either 35 U.S.C. §102, 35 U.S.C. §103 or 35 U.S.C. §112, that the drawings are objected to, that the specification and certain claims are objected to because of various informalities, and that claims 7 and 18 would be allowable.

By this response, Applicant has amended the specification, cancelled claims 19 through 22,and amended claims 1, 2, 4-7, 11, 14-18 and 23 to further define Applicant's invention.

In view of both the amendments presented above and the following remarks, Applicants submit that none of the claims now pending in the application are anticipated or obvious under the respective provisions of 35 U.S.C. §102 and 35 U.S.C. §103. Applicants believe that this application is now in condition for allowance.

OBJECTION TO THE DRAWING

The drawings are objected to for failing to comply with 37 CFR 1.84(p)(5) because they do not include the reference signs mentioned in the specification. In particular, the drawings do not include the sign 400 in FIG. 4 and the sign 500 in FIG. 5.

Applicant has amended the specification, as described above, to delete all references to the signs 400 and 500. These deletions are believed to have no apparent effect on the level of understandability for this application. In light of these deletions, there is no need to amend the drawings. Accordingly, the objection to the drawings is believed to be obviated.

AMENDMENTS TO THE SPECIFICATION

The specification has been amended in a paragraph beginning on page 6 to correct two typographical errors, in two separate paragraphs beginning on page 9 to correct three typographical errors, in a paragraph beginning on page 10 to make an editorial change to improve the readability of the sentence, in a paragraph beginning on page 11 to delete a reference numeral inadvertently missing from the drawing, in a

paragraph beginning on page 12 to correct two typographical errors in notational symbols and to delete a reference numeral inadvertently missing from the drawing, in a paragraph beginning on page 15 to delete reference numerals inadvertently missing from the drawing, in a paragraph beginning on page 16 to correct typographical errors in the equation and in the text, and in a paragraph beginning on page 20 to delete a reference numeral inadvertently missing from the drawing and to make an editorial change. It is submitted that these amendments are justified and proper and add no new matter.

As already noted above, the specification has been amended at page 16 to correct both typographical errors noted in the present Office Action. These corrections are believed to obviate the grounds for objection.

AMENDMENT TO THE CLAIMS

Claims 19, 20, 21, and 22 have been cancelled. Claims 1, 2, 4-7, 11, 14-18 and 23 have been amended to define more clearly Applicant's invention and to address informalities in the claims pointed out in the present Office Action.

Claims 1, 2, 6, 7, 14, and 18 have been amended to call for "the method comprising the steps of". Claims 1 and 23 have been amended to call for "matrix" instead of "matrices". Claims 6 and 11 now call for "channel impairments" instead of "channel impairment". Claims 16 and 17 now call for "said at least one set of in-phase" instead of "said of in-phase". These amendments completely address the claim objections raised in the Office Action. Accordingly, it is submitted that the grounds for objection to claims 1-13, 16, 17, and 23 are obviated.

Editorial amendments were made to claims 1, 4, 5, 7, and 23. An aspect of the invention was clarified in claims 6 and 11 by deleting the first recited determining step and distributing limitations therein to appropriate parts of the remaining claim. An aspect of the invention was clarified in claim 7 to show that "an impairment indicative level" was being compared to a threshold level. In claims 14, 15, and 18, the term "difference data" or "data" was clarified to be "difference error data" consistent with the detailed description on, for example, page 18.

The amendments to the claims add no new matter and are believed to be proper and justified.

REJECTION UNDER 35 U.S.C. §112

Rejection of Claim 19

Claim 19 stands rejected under 35 U.S.C. §112, first paragraph. Claim 19 has been cancelled.

Rejection of Claims 7 and 14-22

Claims 7 and 14-22 stand rejected under 35 U.S.C. §112, second paragraph, as being indefinite. These claims have been amended or cancelled as described above.

Claim 7 stands rejected for insufficient antecedent basis for the term "said at least one set of". The claim has been amended to delete the article "said". Accordingly, claim 7 is believed to have sufficient antecedent basis for this term.

Claim 14 stands rejected as being unclear. This claim has been amended to call for "difference error data indicative of transmission errors in received signals". This amendment is clearly supported by the original specification at page 18 and the original drawings, particularly, FIGs. 5 and 5.

Claim 19 stands rejected for insufficient antecedent basis for the term "said precoder function". Claim 19 has been cancelled.

Claim 21 stands rejected for insufficient antecedent basis for the term "respective transmission channels". Claim 21 has been cancelled.

The amendments to the claims add no new matter and are believed to be proper and justified. In light of the amendments to the claims, it is submitted that amended claims 7, and 14 through 18 are clear, definite and allowable under 35 U.S.C. §112.

REJECTION UNDER 35 U.S.C. §102

Claims 19 and 20

Claims 19 and 20 stand rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent Application Publication US 2003/0086514 of Ginis et al.

(hereinafter "Ginis"). Since claims 19 and 20 have been cancelled, this rejection is believed to be moot.

REJECTIONS UNDER 35 U.S.C. §103

Claims 1-3, 6, 8-13, and 21-23

Claims 1-3, 6, 8-13, and 21-23 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Ginis in view of U.S. Patent 6,314, 135 issued to Schneider et al. (hereinafter "Schneider"). Claims 21 and 22 have been cancelled. With respect to the remaining claims, this rejection is respectfully traversed.

In amended claim 1, Applicants call for:

> *Method for reducing cross-talk in a communications system comprising a plurality of transmitters for transmitting encoded data signals via respective communications channels, said method comprising the steps of:*
> *processing a first encoded data signal according to at least one pre-coding matrix to produce a first pre-coded signal, each said at least one pre-coding matrix having associated with it a respective encoded data signal;*
> *communicating said first pre-coded signal to a respective first communication channel; and*
> *adapting said at least one pre-coding matrix in response to an impairment indicative signal;*
> *said processing tending to offset channel impairments within said first communications channel.*

Applicant introduces a method for reducing cross-talk among a plurality of transmitters. It is important to note that in Applicant's method, encoded data signals are transmitted over communication channels. A first encoded data signal is processed by at least one pre-coding matrix. Each encoded signal is associated with its own respective pre-coding matrix. After the pre-coded signals are generated, they are communicated to their respective channels. Adaptation of each pre-coding matrix is then accomplished responsively to a channel impairment indicative signal. The method is designed to offset channel impairments.

Ginis describes a system that is said to be used to eliminate or reduce signal interference such as cross-talk in DSL systems. In FIG. 14, Ginis shows a transmitter that includes a bank of L precoders and a corresponding bank of L DMT transmitters. The precoders operate on supplied tones. Each precoder receives one particularly designated tone from each of the L encoded data signals so that there are L identical

tones input to the same precoder. In other words, Ginis disassembles each encoded signal into its L component tones so that the tone components of an encoded signal can be distributed separately, one tone to each of the L precoders. This distribution is accomplished for each of the input encoded signals. *See Ginis, FIG. 14 and para. [0122].* Each precoder receives as its input the same component tone from each encoded data signal. Ginis ultimately recombines all the component tones for a particular encoded signal in the cross-couplings to each DMT transmitter.

Ginis fails to teach that the precoder or precoding matrix is associated with a respective encoded data signal as taught and claimed by Applicant. For example, precoder 1420-1 in Ginis is actually associated with all L encoded data signals. The same is true for each other precoder shown in Ginis's FIG. 14.

Ginis fails to teach adaptation of the precoding matrix. Also, Ginis fails to teach, show, or suggest the existence of and impairment indicative signal. The former point has been identified by the Examiner and formed the basis for adding Schneider to the combination of references.

Schneider depicts a single user system including a precoder in the transmitter and method and apparatus for updating coefficients in the precoder via a back channel between the receiver and the transmitter. Schneider shows adaptation on a single channel. When Schneider adapts the precoder coefficients, the precoder operates on a single encoded signal

When Schneider is combined with Ginis to provide adaptation, the resulting combination still fails to meet Applicant's claimed invention. This failure is brought about by the fact that each of Ginis's precoders operates on only a small portion (a single tone) from the encoded signal rather than the entire encoded signal. So each Ginis precoder, if it were adaptable and Applicant does not agree that it is, would expect to receive updated coefficients that are for the same tone for each on the L encoded signals. Schneider shows no way to take the coefficients for a precoder solely associated with a single encoded data signal and dissemble those coefficients into coefficients related to a particular tone of that data signal. As a result, the combination of Ginis and Schneider would have the wrong coefficients applied to the wrong precoders.

In light of these important differences, it is submitted that Applicants' claimed invention would not have been obvious to a person skilled in the art upon a reading of Ginis and Schneider, either separately or in combination, at the time Applicants' invention was made. Since the combined references of Ginis and Schneider fail to teach, show, or suggest Applicants' claimed invention, it is believed that claim 1 as presented is allowable under 35 U.S.C. §103.

In light of the remarks above with respect to amended claim 1, it is submitted that claims 2-3, 6, and 8-13, which depend directly and indirectly from amended claim 1 including all the limitations thereof, are not obvious in view of the combined references of Ginis and Schneider. Therefore, it is submitted that dependent claims 2-3, 6, and 8-13 are allowable under 35 U.S.C. §103.

Claim 23 recites companion apparatus to the method defined in claim 1. As such, the description of the invention and the differences between the claimed invention and the combination of references are believed to have been set forth clearly above in reference to claim 1. In light of the remarks above with respect to claim 1, it is submitted that companion apparatus claim 23 is not obvious in view of the combined references of Ginis and Schneider. Therefore, it is submitted that claim 23 is also allowable under 35 U.S.C. §103.

Claims 4 and 5

Claims 4 and 5 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Ginis in view of Schneider, and further in view of U.S. Patent 6,055,268 issued to Timm et al. (hereinafter referenced as "Timm"). Applicants respectfully traverse this rejection.

Claims 4 and 5 depend directly from amended claim 1 including all the limitations thereof. Claims 4 and 5 call for in-phase and quadrature signals forming CAP modulated signals in claim 4 and QAM signals in claim 5.

Schneider and Ginis, separately and in combination, have been described above. Timm has been added to this combination in order to meet Applicant's limitation of CAP and QAM signals. It should be noted that this teaching appears to be present in Schneider at col. 3, lines 47-49. Nonetheless, the combination of these references still

fails to teach, show, or suggest the limitations present in Applicant's processing and adapting steps in amended claim 1.

In light of the remarks above, it is submitted that neither Ginis nor Schneider nor Timm, separately or in combination, teach, show, or suggest the particular sensor defined by Applicants in claims 4 and 5. Hence, it is submitted that Applicants' claimed invention defined in claims 4 and 5 would not have been obvious to a person skilled in the art upon a reading of the Ginis, Schneider, and Timm references at the time the claimed invention was made. Therefore, Applicants believe that amended claims 4 and 5 are allowable under 35 U.S.C. §103.

Claims 14-17

Claims 14-17 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Ginis in view of Timm and U.S. Patent 6,400,761 issued to Smee et al. (hereinafter referenced as "Smee"). Applicants respectfully traverse this rejection.

In Applicant's claim 14, similar to the limitation in amended claim 1, the processing step provides the limitation that the processing step operates on "at least one set of I and Q signals according to a respective pre-coding matrix." That is, there is an association between the signal set and its respective pre-coding matrix.

Ginis does not show such an association. Timm does not show such an association. While Smee shows adaptation, when Smee is combined with Ginis to provide adaptation, the resulting combination still fails to meet Applicant's claimed invention. As described above, this failure is brought about by the fact that each of Ginis's precoders operates on only a small portion (a single tone) from the encoded signal rather than the entire encoded signal. So each Ginis precoder, if it were adaptable and Applicant does not agree that it is, would expect to receive updated coefficients that are for the same tone for each on the L encoded signals. Smee shows no way to take the coefficients for a precoder solely associated with a single encoded data signal and dissemble those coefficients into coefficients related to a particular tone of that data signal. As a result, the combination of Ginis and Smee, irrespective of the addition of Timm, would have the wrong coefficients applied to the wrong precoders.

In light of the remarks above, it is submitted that neither Ginis nor Smee nor Timm, separately or in combination, teach, show, or suggest the particular method

defined by Applicants in claim 14. Hence, it is submitted that Applicants' claimed invention defined in claim 14 would not have been obvious to a person skilled in the art upon a reading of the Ginis, Smee, and Timm references at the time the claimed invention was made. Therefore, Applicants believe that amended claim 14 is allowable under 35 U.S.C. §103.

In light of the remarks above with respect to amended claim 14, it is submitted that claims 15-17, which depend directly from amended claim 14 including all the limitations thereof, are not obvious in view of the combined references of Ginis, Timm and Smee. Therefore, it is submitted that dependent claims 15-17 are allowable under 35 U.S.C. §103.

ALLOWABLE SUBJECT MATTER

The Examiner has indicated that claims 7 and 18 would be allowable if rewritten in independent form including all the limitations of the base claim and any intervening claims and if the rejections under 35 U.S.C. 112 were overcome. It has been submitted that these claims have been amended to be allowable under 35 U.S.C. 112 as discussed and shown above. But in light of the remarks presented above with respect to claims 1 and 14 from which claims 7 and 18 depend, respectively, it is submitted that these claims are also allowable without a need to write them in independent form at this time.

CITATION OF ADDITIONAL REFERENCES

The Examiner has cited, but not applied, U.S. Patent 6,680,978 issued to Schneider et al. listed on the Notice of References Cited accompanying the present Office Action. This reference has been reviewed by Applicant's representative and is believed to be no more than cumulative over the references already applied to the claims. Since this reference was not applied against the claims, it is assumed that the Examiner concurs in this viewpoint.

In light of the review of this reference by Applicant's representative, it is believed that Applicant's claimed invention would not have been obvious to one having ordinary skill in the art at the time Applicant's invention was made upon a reading of cited reference separately or in combination with the Schneider '978 patent.

CONCLUSION

In light of the remarks above, Applicants believe that this application is in condition for allowance. Therefore, reconsideration and allowance are respectfully requested.

If, however, the Examiner believes that there are any unresolved issues requiring adverse final action in any of the claims now pending in the application, it is requested that the Examiner telephone Gregory C Ranieri, Esq. at (732) 280-1390 so that appropriate arrangements can be made for resolving such issues as expeditiously as possible.

Respectfully submitted,

Dated: June 30, 2005

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